Goddard Procedures and Guidelines

DIRECTIVE NO.	GPG 8710.3	**APPROVED BY Signature:**	*Original Signed by*
EFFECTIVE DATE:	March 12, 2004	**NAME:**	A. V. Diaz
EXPIRATION DATE:	March 12, 2009	**TITLE:**	Director

Responsible Office: 540/Mechanical Systems Division

Title: Certification and Recertification of Ground-Based Pressure Vessels and Pressurized Systems

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PREFACE

P.1 PURPOSE

This directive establishes the requirements for the Goddard Recertification Program (RECERT) to provide Center organizations with test, inspection, certification, recertification, and consultation of ground-based pressure vessels and pressurized systems (PV/S). This Center program is implemented by the RECERT Manager and improves safety, and minimizes or prevents potential personnel injury or fatality, or damage to, or loss of, hardware and facilities.

This directive is not a substitute for applicable Federal, State, and Local requirements. OSHA requirements apply to all GSFC PV/S.

P.2 APPLICABILITY

a. This directive is applicable to ground-based PV/S at Greenbelt, Wallops Flight Facility (WFF), and other areas under GSFC cognizance unless specifically excluded by this directive or by the RECERT Manager.

b. When invoked as a contractual requirement by the applicable project, this directive is applicable to PV/S at off-site contractor installations supporting GSFC flight project work.

c. When requested by the initiating organization, the responsible Contracting Officer and the RECERT Manager shall decide if non-NASA owned PV/S used in non-NASA operations poses a risk to NASA personnel, facilities, or equipment and if so, shall apply this directive to any contractor or tenant.

d. Tenants and their contract personnel operating in facilities exclusively used for non-NASA operations and controlled by the tenant under a Center-level agreement are excluded from this directive.

P.3 AUTHORITY

NPD 8710.5, Safety Policy for Pressure Vessels and Pressurized Systems

P.4 REFERENCES

a. NPR 1700.6, Guide for Inservice Inspection of Ground-Based Pressure Vessels and Systems
b. NPR 8715.3, NASA Safety Manual
c. American Society for Nondestructive Testing (ASNT) *Recommended Practice No. SNT-TC-1A*, Personnel Qualification and Certification in Nondestructive Testing
d. See Appendix A for additional references

P.5 CANCELLATION

GMI 1710.4B, Certification and Recertification of Ground-Based Pressure Vessels and Pressurized Systems

P.6 SAFETY

None

P.7 TRAINING

None

P.8 RECORDS

Record Title	Record Custodian	Retention
Test & Inspection Reports for PV/S	RECERT Manager at Greenbelt, Deputy RECERT Manager at WFF	PERMANENT – pending approval of record schedule.
RECERT documentation	RECERT Manager	*NRRS 3/33G

**NRRS – NASA Records Retention Schedules (NPR 1441.1)*

P.9 METRICS

The RECERT Manager shall document the number of deficiencies, incidents, or mishaps related to PV/S.

P.10 DEFINITIONS

Most of the terms used in this directive are defined in NPR 1700.6 or NPR 8715.3. Those that are unique to this directive, or that require amplification for GSFC applications are listed below.

a. Certification - Written documentation that a set of requirements has been met. As used in this GPG, certification is a process performed by the RECERT Manager that leads to the initial qualification that a PV/S is safe to use within specific certification parameters, and includes, but is not limited to, PV/S compliance and documentation reviews, tests, inspections, nondestructive testing, and analyses.

b. Certification Parameters - The parameters that characterize a pressure vessel or system for safe operation at the original design conditions or at reduced design conditions. These parameters include: (a) material, (b) wall thickness, (c) maximum allowable working pressure or maximum design pressure, (d) temperature, (e) size and shape of pressure vessel, (f) condition of welds (flaws, penetration, porosity, etc.), (g) overpressure protection set point, and (h) system configuration.

c. Division Office – For the purposes of this GPG, use of the term "Division Office" includes Project Offices, Program Offices, and Laboratories.

d. Ground-Based PV/S - PV/S used for ground operations including pressure vessels, piping, flexible hoses, and components for cryogenic service, compressed gases, hydraulic service, and vacuum service. Ground-based PV/S also includes boilers, water towers, jet fuel storage tanks, pressurized research and development setups, and flight project ground support equipment such as purge carts, engineering test units, payload environmental transport systems, and other flight project-specific PV/S used for ground activities.

e. Inservice Inspection (ISI) Interval - The frequency of RECERT inspections or tests for each category of PV/S component. The ISI interval shall be established by the RECERT Manager to ensure operational safety.

f. Modification - Any change to a PV/S, including addition or deletion of components, rerouting of components, or replacement of components with those of a different size, type, or manufacturer, is considered to be a modification. In addition, any nonphysical change to a PV/S, such as changes to operational parameters, is considered to be a modification.

g. Nondestructive Testing (NDT) - The development and application of technical methods to examine materials or components in ways that do not impair future usefulness and serviceability in order to detect, locate, measure and evaluate discontinuities, defects and other imperfections; to assess integrity, properties and composition; and to measure geometrical characteristics.

h. RECERT Documentation - Files that are maintained for PV/S that include, but are not limited to, a unique PV/S identifier, the manufacturer's/fabricator's documents, design data, field test data, safety analyses, results of engineering analyses, repair history, facility descriptions, records of safety variances, rerating, and correspondence.

i. Recertification - Written documentation that a set of requirements continues to be met. As used in this GPG, recertification is a process performed by the RECERT Manager that leads to the continuation of certification that a PV/S is safe to use within specific certification parameters, and includes, but is not limited to, PV/S compliance and documentation reviews, tests, inspections, nondestructive testing, and analyses.

j. Repair – The process of restoring a component or system to a safe and satisfactory condition such that the existing design requirements are met.

k. Replacement – A type of repair completed by the fabrication and installation of spare or renewal components, appurtenances, and subassemblies, or parts of a component or system.

P.11 LIST OF ACRONYMS

ASME	American Society of Mechanical Engineers
ASNT	American Society for Nondestructive Testing
AWWA	American Water Works Association
CSV	Goddard Recertification Program Certification Status Verification System
DOT	U.S. Department of Transportation
FMD	Facilities Management Division
GSC	Goddard Safety Council
GSFC	Goddard Space Flight Center
ISI	Inservice Inspection
NDT	Nondestructive Testing
NRRS	NASA Records Retention Schedules
OEM	Original Equipment Manufacturer
OSHA	Occupational Safety and Health Administration
PV/S	Pressure Vessels and Pressurized Systems
RAC	Risk Assessment Code
RECERT	Goddard Recertification Program
WFF	Wallops Flight Facility

PROCEDURES

1. Responsibilities

1.1 Applied Engineering and Technology Directorate

a. Appoints an individual to the position of RECERT Manager, subject to approval by the Center Director.
b. Appoints a Deputy RECERT Manager for WFF with responsibilities as described herein.

1.2 RECERT Manager

a. Maintains overall responsibility for the management, implementation, and enforcement of the Center's PV/S Recertification Program;
b. Provides technical direction to the Deputy RECERT Manager and the RECERT Support Contractor;
c. Serves as the GSFC interface with NASA Headquarters and other NASA Centers on matters pertaining to PV/S;
d. Serves as the GSFC representative on the NASA PV/S Working Group;
e. Participates on the Goddard Safety Council (GSC);
f. Serves as the Certifying Authority for the certification and recertification of ground-based PV/S to which this directive is applicable;
g. Establishes and maintains a system for periodic PV/S ISI, including identification of deficiencies, and completion of corrective actions;

h. Ensures that certification and recertification tests and inspections are performed by personnel properly qualified and certified in accordance with applicable codes and standards;
i. Provides consultation on PV/S compliance including design, specification, and modification;
j. Approves the rerating of PV/S;
k. Reviews and concurs with safety variance requests prior to submittal to the GSC and Center Director for approval;
l. Establishes and maintains a RECERT Certification Status Verification (CSV) system for PV/S;
m. Performs compliance spot checks of PV/S to ensure that the requirements of this GPG are being followed;
n. Provides Division Offices with an inventory of Division-owned PV/S for review and update as required; and
o. Coordinates with affected Center safety offices on issues of mutual interest.

1.3 Deputy RECERT Manager. The Deputy RECERT Manager serves as the RECERT Manager's alternate and represents the RECERT Manager at WFF for day-to-day operations.

1.4 Division Offices:

a. Ensure documented compliance to this directive;
b. Ensure that the design, fabrication, installation, and testing of new PV/S, and modifications and repairs to existing PV/S, are in compliance with applicable codes and standards;
c. Ensure that the design of new PV/S or modifications to existing PV/S are submitted to the RECERT Manager for compliance review prior to procurement and request the RECERT Manager to certify the PV/S when installation, modifications, or repairs are complete;
d. Ensure that all applicable documentation listed in NPR 1700.6 is furnished to the RECERT Manager for equipment certification prior to operation of new, modified, repaired, or transferred PV/S. The supply of such documentation should be made a part of any PV/S procurement;
e. Ensure that new, modified, repaired, relocated, or transferred PV/S are certified or recertified prior to use;
f. Control uncertified PV/S to preclude inadvertent use;
g. Notify the RECERT Manager prior to any changes in PV/S configuration;
h. Maintain responsibility for day-to-day operations of PV/S under their cognizance;
i. Ensure that OEM-recommended maintenance is performed on PV/S;
j. Submit requirements to the appropriate budget to bring Division-owned PV/S into compliance with this directive;
k. Ensure that any research and development or test and evaluation activities conducted within or in association with a PV/S will not adversely impact the structural integrity or safety of the PV/S;
l. Notify the RECERT Manager in advance of any non-NASA projects making use of PV/S that may pose risk to NASA personnel or equipment so that applicability of RECERT Program requirements may be determined;
m. Provide availability of PV/S for the scheduled RECERT ISI required to maintain certification;
n. Coordinate ISI with the RECERT Manager to minimize schedule conflicts;
o. Notify the RECERT Manager immediately of all PV/S deficiencies and failures, and initiate and process the appropriate Incident/Mishap Report;

p. Initiate repair of PV/S deficiencies discovered during test and inspections, and notify the RECERT Manager upon completion of corrective actions;
q. Notify the RECERT Manager of any PV/S that is removed from service;
r. Perform compliance spot checks to verify operations are conducted within the operational parameters of the PV/S; and
s. Ensure that PV/S are operated and maintained by skilled, adequately trained, and qualified personnel who shall be certified in accordance with NPR 8715.3.

1.5 Safety and Environmental Division

a. Reviews RECERT operations for compliance with OSHA, NPD 8710.5, and NPR 1700.6; and
b. Monitors the institutional safety requirements of this directive.

1.6 Facilities Management Division (FMD). FMD shall notify the RECERT Manager of any planned PV/S acquisition, installation, modification, repair, relocation, or removal as part of any facilities project. To ensure compliance and certifiability, all PV/S designs and specifications shall be supplied to the RECERT Manager for review prior to contract implementation.

2. RECERT Program Requirements

2.1 PV/S Subject to RECERT. Ground-based PV/S are included in the RECERT Program and are subject to formal certification and recertification with the exception of those PV/S delineated in Section 2.7 or specifically excluded by the RECERT Manager.

2.1.1 PV/S Design and Installation. PV/S and components, including flexible hoses, shall be designed, fabricated, installed, operated, inspected, and repaired in accordance with this directive, including the applicable codes, standards, guides, and Federal regulations referenced in Appendix A.

2.1.2 PV/S Analysis and Certification. PV/S shall be certified before first use and recertified periodically after initial certification. PV/S will be certified after compliance to NPR 1700.6 and this directive is substantiated and validated. System operation for the purposes of code compliance pressure testing or acceptance testing is permitted so long as the RECERT Manager is notified in advance of the testing.

2.2 Inservice Inspection. In order to maintain Certified status, PV/S are subject to RECERT inservice inspection (ISI). An ISI Plan shall be developed by the RECERT Manager for each PV/S listing the components to be inspected, the inspection method(s), and the interval between inspections. Copies of all PV/S ISI reports, including those from Contractor installations if applicable, shall be forwarded to the RECERT Manager annually for review and record keeping.

2.3 Modifications, Repairs, and Replacements.

2.3.1 PV/S Modifications. Any modification to a PV/S voids its certification. Proposed modifications shall be submitted by the owner organization to the RECERT Manager for Code compliance review prior to execution.

2.3.2 PV/S Component Repairs. Repairs to PV/S components shall be permitted without prior approval of the RECERT Manager provided that the fit, form, or function of the component is not altered, or that the repair does not affect the operational parameters of the system. No repairs to overpressure protection devices are permitted.

2.3.3 PV/S Replacements. Applicable documentation shall be submitted by the owner organization to the RECERT Manager for Code compliance review prior to execution of system, subsystem, or component replacement.

2.3.4 System Recertification. Upon completion of modifications or replacements, the RECERT Manager shall recertify the system. The system shall not be put into service prior to recertification. System operation for the purposes of code compliance pressure testing or acceptance testing is permitted so long as the RECERT Manager is notified in advance of the testing.

2.4 Derating

The feasibility of derating a PV/S shall be determined based upon the results of tests, inspections, and engineering analyses performed by the RECERT Manager or other organization authorized by the RECERT Manager. The new certified operating parameters shall be considered permanent, and the PV/S shall be tagged accordingly. A PV/S may be derated by the RECERT Manager to less severe service conditions in order to:

a. Mitigate hazards that exist at the design or currently certified service conditions; or
b. Extend the useful life of the vessel or system by limiting the service conditions to which the vessel or system is exposed.

2.5 Transfer of PV/S

2.5.1 PV/S and associated certification documentation transferred to GSFC shall be reviewed for recertification.

2.5.2 Certification documentation shall accompany PV/S permanently transferred from GSFC to other locations of users.

2.6 Tagging

Tagging of PV/S indicating the certification status shall be as authorized by the RECERT Manager.

2.7 Excluded PV/S

2.7.1 The following types of PV/S are excluded from the RECERT Program due to their inherently low energy, their national record of operation without serious incident, or because they are subjected to periodic tests and inspections in accordance with requirements other than those contained in the RECERT Program.

a. Flight pressure vessels and systems*.
b. Commercially manufactured heating, ventilating, and air conditioning (HVAC) systems, and refrigeration systems (refrigerators and freezers) used expressly for their intended purpose.
c. Utility water systems.
d. Glove boxes.
e. Commercially prepackaged off-the-shelf laboratory equipment, such as analyzers, gas chromatographs, etc.
f. Commercially available motorized vehicles.
g. Welding equipment.
h. Compressed gas cylinders that comply with DOT regulations.
i. Cryogenic liquid dewars that comply with DOT regulations.
j. Utility-owned, -operated and -maintained natural gas supply and distribution systems.
k. Vendor-owned and –operated PV/S used for commodity delivery, such as LN_2 tankers, etc.
l. Fire protection systems including:
m. Portable fire extinguishers;
n. Standpipe and hose systems;
o. Automatic sprinkler systems;
p. Fixed dry chemical extinguishing systems;
q. CO_2 extinguishing systems; and
r. Halogenated extinguishing agent systems.
s. Breathing air systems.
t. Vacuum vessels with a capacity less than 100 cubic feet.
u. Piping systems whose internal design pressure is less than 14.7 psig.
v. Vent or drain lines open to atmosphere.
w. Plastic piping, tubing, flex hoses, and related components which meet all of the following:
x. Nominal diameter is eight (8) inches or less;
y. Working pressure is a maximum of 150 psig and within the manufacturer's pressure, temperature, and fluid service rating;
z. Fluid service is limited to air, nitrogen, helium (or other inert gas), propane, natural gas, or water.
aa. Contractor PV/S used on-site which are exclusively associated with facility repair, maintenance, modification, or construction activities.

* Flight PV/S shall not be used in ground-based systems or for ground-based operations without a Center-approved safety variance as delineated in Section 5 and certification by the RECERT Manager prior to use.

2.7.2 Specific PV/S that are not generically excluded by Section 2.7.1 may be excluded on a case-by-case basis according to the following.

a. To be excluded, the owner organization must develop a safety variance request package as delineated in Section 5.
b. The Risk Assessment Code (RAC) must be 5, 6, or 7 (see NPR 8715.3).
c. The safety variance expires after five (5) years. If the owner organization wishes to continue the exclusion, a new safety variance request package shall be developed.

2.7.3 Items excluded from the RECERT Program may be reviewed and evaluated for compliance with test and inspection requirements of applicable codes and standards by the RECERT Manager at the specific request and funding by the item owner organization.

3. RECERT Certification Status Verification System

A RECERT Certification Status Verification system (CSV) at Greenbelt and WFF shall be maintained by the RECERT Manager to ensure that the documentation for each PV/S reflects its field configuration. The CSV documentation shall include certified design configuration; records of PV/S modifications, repairs, replacements; PV/S certification status; identification of PV/S deficiencies and status of corrective actions; and ISI schedules. The CSV shall be capable of providing traceability to component manufacturer's make, model, serial number, and other distinguishing information to enable component searches in response to safety alerts or manufacturer's recalls.

4. Personnel Qualification and Certification Requirements

4.1 Personnel Performing Nondestructive Testing

Personnel performing PV/S NDT, including visual inspections, shall be qualified and certified by their employer in accordance with written practices meeting the requirements contained in American Society for Nondestructive Testing (ASNT) *Recommended Practice No. SNT-TC-1A*, Personnel Qualification and Certification in Nondestructive Testing.

4.2 Pressure System Operators

PV/S shall be operated and maintained by skilled, adequately trained, and qualified personnel who shall be certified by their supervisor in accordance with NPR 8715.3.

5. Processing of Safety Variances

5.1 Safety variances to the requirements of this directive shall be prepared and approved as outlined in NPR 8715.3 prior to operation.

5.2 If a mandatory requirement of this directive cannot be met, a detailed safety variance request package shall be prepared by the requesting organization in accordance with NPR 8715.3.

5.3 A risk acceptance plan shall be developed with supporting information including, but not limited to, operational and maintenance parameters, special constraints or instructions required for safe operation, any special training needs, required personal protective equipment, engineering and procedural controls, and any special inspection requirements.

5.4 The safety variance request package shall be reviewed and the risk accepted by the initiating Division Office and forwarded to the RECERT Manager for review and concurrence.

5.5 The initiating Division Office will submit the safety variance request package to the GSC Chair, who will forward the safety variance request for risk acceptance and approval by the Center Director. Safety variance requests approved by the Center Director will be forwarded to NASA HQ/QS within 14 days.

Appendix A: Codes, Standards, and Guides for Ground-Based PV/S

Conformance to the codes, standards, and guides delineated herein is mandatory. Where reference is made to any of these documents, it is to the latest edition of that document, unless specifically noted otherwise. Regulations promulgated by Federal, State, or Local authorities which are applicable to specific PV/S shall be considered to be included herein. In the event of a conflict between the requirements of a referenced document and the requirements of this directive, this directive takes precedence, with the exception that the requirements contained in Federal Regulations always take precedence. The RECERT Manager may invoke the requirements of other codes, standards, and guides when specific situations warrant.

a. ASME B19.1, Safety Standard for Air Compressor Systems

b. AWWA Standard for Inspection and Repairing Steel Tanks, Stand Pipes, Reservoirs and Elevated Tanks for Water Storage

c. AWWA D102-78, Standard for Painting Steel Water Storage Vessels

d. ASME Boiler and Pressure Vessel Code

e. ASME B31 Code for Pressure Piping

f. American Petroleum Institute (API) Codes

g. NB-23, National Board Inspection Code, published by the National Board of Boiler and Pressure Vessel Inspectors

h. ASME B40.1, Code for Gauges, Pressure Indicating Dial Type - Elastic Element

i. United States Air Force Technical Manual, T.O. 00-25-223, Integrated Pressure Systems and Components (Portable and Installed)

CHANGE HISTORY LOG

Revision	Effective Date	Description of Changes
Baseline	03/12/2004	Initial Release